The Future of Work and its Implications

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Introduction

There are several forecasts about the impact of emerging technologies on the future of work around the world. The estimate from McKinsey Global is that, while only a small proportion of jobs can be fully automated with machine intelligent/AI systems, at least 30% of the majority of all occupations will be impacted[1]. This is likely to effect up to 1.2 billion employees world-wide equivalent to app. 50% of the world's economy. Some 60% of all work will require balancing the human:technology interface. We are all going to have to learn to "dance with robots" (Levy and Murnane, 2013)[2].

Focusing on job shifts due to technology is not the only shift we are seeing which will impact the future of work. Other shifts include:

1. **Demographic Shifts**
    a. Canada's workforce is shrinking relative to those who are not yet in work or have left the workforce. The dependency ratio (the ratio of those in work to those not in work) is due to shift from 4:1 (2015) to 2:1 (2030).
    b. 30% of Canadians will be over 60 years of age in 2030. There will be more senior citizens than students in school for the first time in the history of Canada.
    c. By 2040 there will be over 9 billion people living on earth.
    d. Globally, the proportion of individuals over 65 will double by 2050, with 80% of these individuals living in low or middle-income countries. In Italy, Japan and Spain, 1 in 3 persons will be over 65 years old.

2. **The Nature of Work – The "Gig" Economy**
    a. App. 46% of the Canadian workforce are contingent workers – contracted for services rather than an employee.
    b. The largest number of contingent workers in Canada are those under the age of 35.
    c. Canada has the third largest contingent workforce in the world after New Zealand and the US.

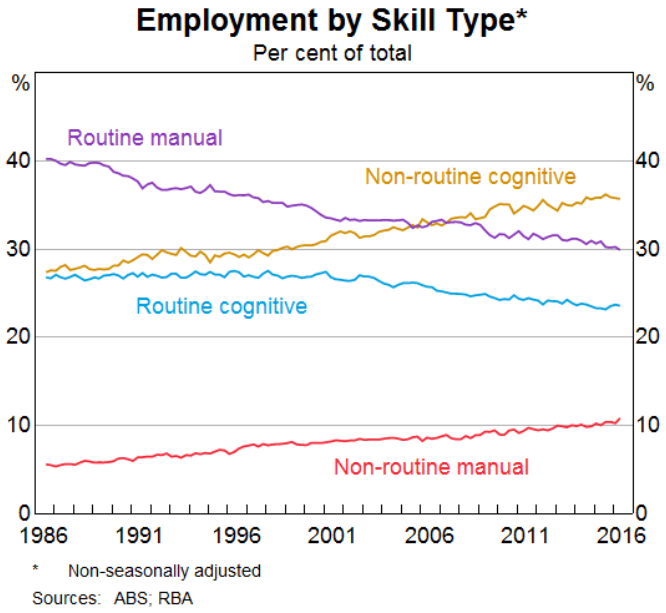
d. Most major employers intend to expand their contingent workforce and shrink their full-time workforce. In the Fortune 100 companies contingent workers make up 30% of the workforce.

3. The Nature of Work – Uber-Like Organizations

a. On demand services (uber-like) services will continue to grow and expand. These include:
   i. Uber – matches drivers with those needing a ride..
   ii. 99 Designs – matches designers with those needing design work
   iii. Rent-a-Coder – matches those with coding capabilities with those who need purpose built software / applications
   iv. Trendwatching – trend analysts track small and large data and patterns and offer their services against challenges
   v. Amazon Go – a shop without tellers or check-out
   vi. Alibris – global bookseller which is actually a brokerage
   vii. Lynda - learning on demand (also Creative Live..)
   viii. Fiverr - rapid professional services on demand
   ix. Task-Rabbit – matching local skills with local needs (e.g. odd jobs, gardening, window cleaning, catering, tutoring...)
   x. Skip the Dishes – restaurant meals delivered to your door on demand.

b. The average life of the firm is getting shorter. For example, the average tenure of companies on the Standard & Poor 500 has fallen from 90 years (1935) to 11 (2015).

c. There is also a shift from routine work to more creative work, as shown in this graph showing the shifts in the Australian workforce:



4. **Shifts in Regional Economic Geography**
    a. By 2025 almost 50% of the world's $1 billion companies will be headquartered in emerging markets. 41% of them are already Asian based.
    b. By 2030 there will be 2.3 billion new middle class consumers, the majority of these in emerging markets.
    c. 425 major cities will fuel global economic growth. 315 of these are in Asia.

5. **Technological Shifts**
    a. Significant developments in machine/artificial intelligence, 3D printing and manufacturing, robotics, stem cells, battery technology and biotechnology will have a significant impact on the global economy.
    b. Frey and Osborne (2013) of the Oxford-Martin school (UK) estimate that emerging technologies will have a significant and substantial impact on employment – up to 47% of all US employment[3]. The estimates for Canada are similar at 42%[4].
    c. In most past examples of technology innovation displacing workers, new work has emerged which leverages these same technologies. However, experience from the US, the global leader in such new industries and occupations, suggest that the employment share in new industries is strikingly small, amounting to no more than 0.5% of the US work-force.
    d. To make the impacts clear, Alberta's oil and gas sector has found ways of securing profitability and productivity with less labour and a lower price per barrel. Lower operating costs price per barrel of oil produced – now down to between $7 and $8/barrel for in-situ oil with predictions of these costs falling 20-30% over the next decade[5].

These five factors are leading to a new understanding of the place of work in society and in the lives of Canadians. They also raise three broader socio-economic issues: (a) the impact of these developments on personal identity – for many, work is a major component in the understanding of "self" (Gini, 1998)[6]; (b) the implications of economic growth which depends less on employment than on technology for families, community and society[7]; and (c) the impact on public policy of a large-scale disruption in the patterns of work and employment and on supports for individuals, families and society.

Five Major Questions

These developments raise important questions about Canada's future. Here are five – all focused on learning and the need for skills, though each of these raise many more questions:

1. Should Canada significantly increase economic immigration so as to respond to the demographic challenges outlined here? If it does, what are the implications for Canada's education system, health system and social supports?

The Economic Advisory Council to the Government of Canada, in reviewing Canada's challenges, suggests that permanent economic immigration needs to increase by an additional 150,000 annually so as to maintain (and possibly) improve Canada's competitive position in the global economy[8].

Canada is experienced in welcoming and absorbing immigrants from around the world, but it has an impact on classroom complexity in Canada's school system, already seen as amongst the most complex in the world. A study by the Canadian Teachers Federation conducted in 2012 showed[9]:

- Students with identified exceptionalities accounted for 16.3% of total students in the surveyed classrooms, ranging from respective shares of 17.1% for grades 4-8 to 10% of students for junior kindergarten/kindergarten.
- As with class size, average numbers only tell part of the story. Of classes surveyed, over 81% have at least one student with formally identified exceptionalities, and 27.7% contain 5 or more students with identified exceptionalities.
- In grades 4 and over, not only were class sizes generally larger but almost 1 in 3 (30.6%) classes contained 5 or more students with identified exceptionalities [see Chart 3].
- In addition, the average number of English Language Learners and French Language Learners (ELL/FLL students) per class was 2.6. The prevalence was higher the lower the grade, ranging from 4.7 students for junior kindergarten/kindergarten to 1.7 students for grades 9 and over.
- A study by the Alberta Teachers' Association also suggests that, other than Japan, Alberta teachers work more hours than any other teachers in the world in part because of classroom complexity[10].

Immigration also has an impact on communities, who become both more diverse but also more aware of the impact of immigration on social structures and systems. It is sometimes a source of tension and political complexity, despite strong evidence of the positive impact immigration has on the economy (Beiser, 1999)[11].

2. Should Canada take an early lead in providing income support to individuals and communities disrupted by technology?

A number of jurisdictions (including Ontario) are experimenting with a guaranteed minimum income. These jurisdictions include Finland, Netherlands, India and California[12] who look at either a fixed personal portion of the gross national income or as a development bonus, reflecting an investment in people based on gains in national income due to technology innovation – a kind of "tax on robots". Such a scheme would both guarantee a basic income and replace many tax credits and current welfare payments. Major advocates for this include Kalle Moene and Debraj Ray, two of the world's leading development economists[13].

Canada has been here before. In the period 1974-179 over 1,000 adults in the small community of Dauphin Manitoba were all paid a basic annual income[14]. This investment in people eliminated poverty, increased educational attainment and led to healthier life-styles (and lower per capita health costs) when compared to matched individuals in other Manitoba communities[15].

3. Does Canada need to rethink its access to learning for adult learners and make a major investment in anywhere, anytime life-long learning?

The UN's sustainable development goal 4 is explicit: "ensure inclusive quality education for all and promote life-long learning". This will become increasingly important as learning becomes the key to productivity, competitiveness and job-satisfaction.

Canada has a number of significant skills gaps and, in some cases, these are harming communities, organizations and Provincial economies. There are six such gaps:

- ***Gap 1: The Basic Gap***: The gap between what employers are seeking and what they can find in the labour market.
- ***Gap 2: The Expectations Gap*** – The gap between what an employee expects to experience at work and what they actually find themselves doing.
- ***Gap 3: The Productivity Gap*** – The skills we need to develop to significantly improve productivity.
- ***Gap 4: The Leverage Gap*** – The underutilization of skills in the workforce.
- ***Gap 5: The Futures Gap*** – The gap between current skill sets and the skills we need to become competitive in the 4th industrial revolution.
- ***Gap 6: The Innovation Gap*** - The skills we need to build a more innovative and sustainable economy.

These skills gaps are expensive, both in terms of the overall economy and lost tax revenues. In Ontario, according to the Conference Board of Canada, the skills gap costs $24.3 billion in foregone GDP, $4.4 billion is lost Federal tax revenues and a further $3.7 billion in Provincial tax revenues.

A radical response to these challenges is needed if the workforce needed for an emerging and different economy is to be in place. While many have proposed solutions (e.g. Conference Board of Canada, 2013; Information and Communications Technology Council, 2016)[16] they are rarely acted on with any sense of urgency. The consequence is that many organizations are ill prepared for the changes and that colleges, polytechnics and universities play constant "catch-up" trying to adjust and realign their offering to meet demand. This "catch-up" is one reason that many employers think that the education system is not providing the skilled employees it seeks – 96% of college, polytechnic and university leaders say that they do, but only 11% of employers agree[17].

These challenges led the Advisory Council on Economic Growth to suggest that greater collaboration between industry and higher education was needed and to propose a FutureSkills Laboratory for this work[18].

4. **Does Canada need to refocus its school system on the four pillars proposed by the Delors Commission for UNESCO (1996)[19]:**

- **Learning to know:** to provide the cognitive tools required to better comprehend the world and its complexities, and to provide an appropriate and adequate foundation for future learning.
- **Learning to do:** to provide the skills that would enable individuals to effectively participate in the global economy and society**.**
- **Learning to be:** to provide self-analytical and social skills to enable individuals to develop to their fullest potential psycho-socially, affectively as well as physically, for a all-round 'complete person.
- **Learning to live together:** to expose individuals to the values implicit within human rights, democratic principles, intercultural understanding and respect and peace at all levels of society and human relationships to enable individuals and societies to live in peace and harmony.

Given the nature of the changes in work and society we are likely to see, the nature of schooling becomes an important challenge. While many Canadian jurisdictions are in the midst of curriculum change, these changes have tended to focus on increasing the focus on essential skills, science, technology, engineering and mathematics on the assumption that these will be the "disciplines" most in demand for the future. This is despite compelling evidence that such thinking is problematic. For example:

- The majority of STEM graduates (both college and university) do not work in STEM jobs.
- A large number (app. 40%) of those who do work in STEM jobs do not have a STEM educational background or qualification.

- In some economies (notably the UK), the fastest growing sectors of the economy are services and the creative industries. In these sectors, STEM graduates find it tough to secure sustained employment. – they require significant "soft" and design skills.
- Full time employment rates for most creative subjects and language graduates are no different from those from business studies, or engineering and are better than those from computer science.
- Fine arts students and those pursuing creative writing careers tend not to be in full time employment, but are either self-employed (think entrepreneurial artist) or part-time employed.
- Graduate unemployment rates show no particular trends – stable at around 9%.

Refocusing school-based learning on the Delors four pillars may better prepare individuals for the challenges and uncertainties of the 4th industrial revolution provided that there is also a strong focus on basic literacies, including emotional intelligence.

Canada has an essential skills challenge which is becoming more acute. 50% or more of the students leaving high school have literacy skills below the levels required for high performance in colleges and universities or the workplace. The data also show that 60% of college students enter college or university with literacy skills below the level needed to be effective learners in their chosen programs of studies. 40% leave their program with literacy skills below the level needed by their chosen occupation. While literacy levels generally improve during post-secondary education, they do not do so at a level which removes literacy as a concern for employers. Indeed, some post-secondary educational programs lead to literacy skills loss rather than gain and the retention of skills after college is seen, in some specific cases at least, to be problematic[20].

5. Does Canada need to introduce incentives for learning and skills development?

Some jurisdictions have developed significant incentives for learning – free tuition for post-secondary education (Germany, France, Norway, Denmark, Sweden, Finland, Belgium, Greece, Czech Republic, Italy, Austria, Spain) or tax credits for life-long learning[21]. Others have developed "learning credit banks" (China[22]) or encourage learners to maintain e-portfolio's so as to capture and develop capability and competency profiles(UK)[23]. Given that many employers no longer see certificates, diplomas and degrees as a sufficient basis for employment - IBM, Starbucks, Apple, Google, Ernst & Young, Penguin Random House, Hilton Group, Publix among them - there may be a need to think differently about the way in which learning is captured and presented.

While Canada leads the OECD in educational attainment, with more than half of Canada's population having a high school diploma and 54% of those aged 24-65 having either a college or university qualification – up from 48% in 2006[24] - there are still significant educational

inequalities. First Nations learners access higher education less than their Canadian counterparts and have lower completion rates[25]; learners from lower income homes also access higher education less and have lower rates of completion[26]. As per capita funding for higher education continues to fall and costs of higher education to be paid by the student rise, access and success become increasingly problematic for marginalized groups in society[27]. As student debt levels rise – total student debt in Canada (2012) sits at $28 billion – then household debt rises (it is now 171% of disposable income and exceeds the size of the Canadian economy by $1.6 trillion)[28], leading to questions about the return on investment from higher education. While freezing tuition fees(Alberta), offering student assistance programs (Ontario, New Brunswick) or creating new routes to access for targeted groups (British Columbia) may be helpful moves for a short period of time, they cannot be seen as strategic responses to both the challenges and opportunities afforded to Canada when faced with a need to rethink the place of learning and work in society.

The Future

Canada's only competitive advantage will result from the speed at which people learn. Small incremental steps are unlikely to be appropriate responses to the five forces which will lead to significant and substantial changes in Canadian society and the place of work within it as described in this paper. A bold new agenda for the future of Canada is needed – one which enables both public and private organizations to collaborate to build a Canada fit for the next industrial revolution, which is already having an impact.

This agenda needs to include:

- A focus on rethinking education from kindergarten through to graduate programs.
- Reposition skills and learning for skills, especially with respect to trades and practical skills so as to reduce or eliminate the skills gaps.
- Rethinking the way in which resources are allocated to support both learning, workforce development and the organizations that support this work.
- Rethinking the way in which learning is financed and incentivized.
- Rethinking the way in which lifelong learning is encouraged at work and in communities.
- Strengthening collaboration between educational organizations and employers.
- Reducing inequality in access to and success in learning.

Canada is not the only jurisdiction facing these challenges, but is one which is well positioned to build on its significant strengths in educational attainment, quality of educational provisions and its substantial education infrastructure. Now is the time for action.

Notes and References

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(Accessed on 17th November 2017). See also this video presentation https://www.youtube.com/watch?v=fissJgE6f3Q

[14] For a description of this program see http://www.huffingtonpost.ca/2014/12/23/mincome-in-dauphin-manitoba_n_6335682.html (Retrieved 10th September 2017).

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[27] See an analysis of these issues at https://academicmatters.ca/2016/01/higher-education-and-growing-inequality/ (Accessed 17th November 2017).

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